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Evaluation of Physico - Chemical Parameters of Ponds in Kodumon Panchayat

Divya S Rajan¹✉, Jithu J²

ABSTRACT

Ponds are, in fact, very small and shallow bodies of quite standing water with only slight wind action. The primary requisite for fish culture in ponds is the water, which for successful rearing of fishes should offer the most favourable conditions for the existence not only of fish but of other aquatic organism as well, which form the food of fish. This paper deals with the study of physico-chemical parameters of water in two different ponds situated in Kodumon Panchayath. The study was made in the pre-monsoon season of 2014. The samples of water were collected using standard methods. Comparative study of certain hydrographical parameters showed that the first pond, Puthenkavil pond was slightly acidic with relatively lesser amount of dissolved oxygen. The results of this analysis point out the fact that all the parameters were within permissible limits prescribed by BIS water standards. The water qualities of these ponds were thus analysed and can be used for domestic and irrigation purposes.

Key words: Water quality, eutrophication, physico-chemical parameters, primary production

1. INTRODUCTION

The availability of good quality is an indispensable feature for preventing disease and improving quality of life. Fresh water has become a scarce commodity due to over exploitation and pollution (Ghose and Basu, 1968; Ipinmoroti and Oshodi, 1993; Asaolu 1997). Chemical parameters of any aquatic ecosystem are necessary because hydrochemistry affects its biota to a great extent. Water quality influences the existence and growth of aquatic organisms. Industrial, sewage, and municipal wastes are being continuously added to the water reservoir affecting the physico-chemical quality of water making it unfit (Dwivedi and Panday, 2002; Shinde *et al.*, 2011).

Water is a vital resource used for various activities such as drinking, irrigation, fish production, power generation, etc. Increased human activities over the last 25 years are imparting a greater stress on these ecosystem resulting changes in their features.

The present study is about the analysis of physico-chemical parameters of water in two different ponds situated in Kodumon Panchayath. Puthenkavil pond exhibited relatively lower dissolved oxygen content. There is a need of scientific management of exploitation and conservation of these natural resources. To

achieve this goal there is an urgent need of basic and applied research at various aspects for conserving aquatic ecosystem.

2. METHODOLOGY

The present study was conducted and samples were collected from 2 different ponds during pre-monsoon season of 2014. Water samples were collected in clean polyethylene bottles without air bubbles and brought to the laboratory. The hydrological parameters such as water temperature, pH, dissolved oxygen, carbon dioxide, and productivity were analysed. Analysis of physico-chemical parameters was done as follows.

Temperature

The temperatures of water sample were determined by an accurate centigrade thermometer. The result is expressed in degree Celsius.

pH

pH was estimated by digital pH meter.

Dissolved oxygen

DO was estimating by Winkler's method. This method is a standard procedure for oxygen measurement in water. It involves reaction with MnSO₄, alkaline iodide and concentrates sulphuric acid. At first water is taken in a BOD bottle and precaution is taken to reduce contact water with air to minimum. Allow the water to overflow, through the tap of the BOD bottle, make sure that no air bubbles are trapped in it. Then add 1ml of MnSO₄ followed at the bottom of the sample bottle displacing water at the bottle. Then add 1ml alkaline iodide to the sample. Use of separate pipette for these two reagents. A white or brownish colour precipitate is formed on introducing the agent. Vigorously shaken for 2minutes. When the precipitate is settle, carefully remove the stopper and add 2ml con. Sulphuric acid making sure that the tip of pipette is just under the water sample. Replace the stopper without trapping air bubble. Shaking vigourously and repeatedly invert bottle, until the precipitate is dissolved. Pipette out 20 ml water sample from the BOD bottle and introduce into a conical flask. Titrated 0.01N sodium thiosulphate from the burette till the samples turns yellow. Add 1 drop of starch solution as indicator and mixed well. The sample turns blue and continues the titration carefully till the blue colour disappears. Productivity was determined by Light and Dark bottle method.

3. RESULTS AND DISCUSSION

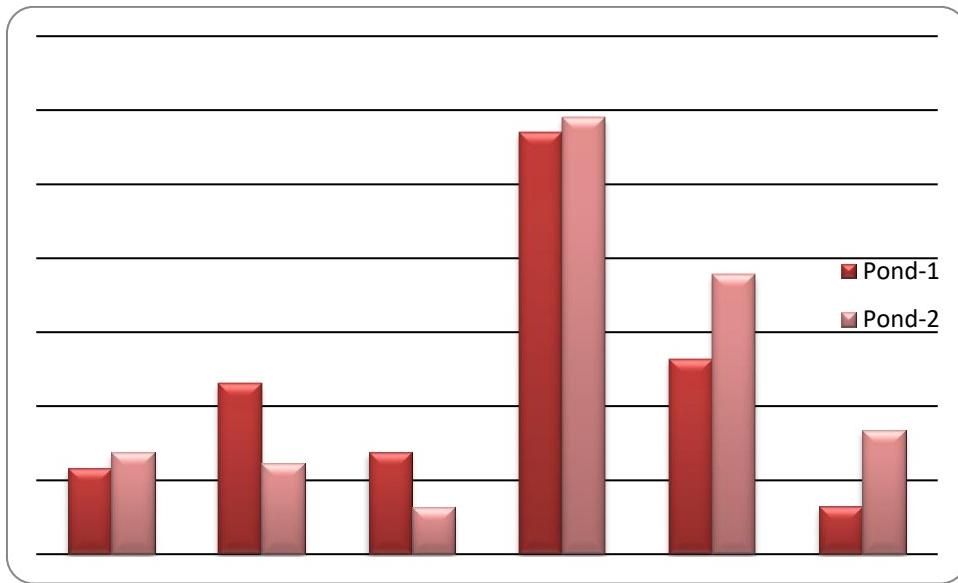
The present study is based on the concentration of the parameters in two pond water samples. The parameters like DO, productivity, free carbon dioxide, temperature and pH of two ponds showed variations. In pond-1 the DO level is 3.2ppm, the DO carbon dioxide is 13.2ppm, temperature is 28 degree Celsius, and pH is 5.83. In the case of pond-2 DO is 8.4ppm, DO carbon dioxide is 18.9ppm, temperature is 29 degree Celsius, and pH is 6.86. The first pond is slightly polluted as compared to the second pond, due to the dumping of garbage and household waste etc. The optimum pH level of DO in water is between 3-6ppm. So the fish diversity is comparatively less in pond-1. Gross production and net production of pond 1 was 11.52 mgC/l/day and 6.9mgC/l/day. Pond 2 exhibited a gross and net production of 6.12mgC/l/day and 3.16mgC/l/day. Most oxygen depletions cause partial fish kills (Roper *et al.*, 2001).

Table 1

Physico-chemical parameters of selected two ponds

Serial number	Parameters	Pond-1	Pond-2
1	pH	5.83	6.86
2	Gross productivity	11.52 mgC/l/day	6.12mgC/l/day
	Net productivity	6.9mgC/l/day	3.16mgC/l/day
3	Temperature	28.5°C	29.5°C
4	Free carbon dioxide	13.2ppm	18.9ppm
5	Dissolved oxygen	3.2ppm	8.4ppm

Graph showing variations of hydrological parameters of two ponds



Temperature measurements are useful in indicating the trends of biochemical and biological activities in water body. The biological activities are enhanced by higher temperature. They provide information on the productivity of the environment. There are many such aquatic ecosystems that remain unexplored (Smith, 1997). The water bodies including lake can be classified based on their productivity nature by analyzing the primary productivity (Rhode, 1958).

4. CONCLUSION

In the present study the concentration of all the parameters in the samples were found within the permissible limit as prescribed by BIS standard. But in pond 1, comparatively acidic pH and less dissolved oxygen values were observed that will affect the fish diversity. Ponds exhibited primary production range that was desirable. Knowledge of water quality parameters will help aquaculturists determine the potential of a body of water to produce aquaculture species ,to maintain or to improve water quality in the culture system to minimize problems of fish stress and produce high quality aquacultural products, to reduce impact of effluents and to realize more efficient production and greater profits. There is an increasing tendency of these fresh water resources getting degraded due to the dumping of the industrial and agricultural effluents, domestic sewages etc. In an uncontrolled manner they create potential health hazards and render them unsuitable for various purposes such as drinking, irrigation, pisciculture and recreation. This is a matter of serious concern among environmentalists, public makers as well as researchers.

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Declaration of conflicting interests

The authors declare that there are no conflicts of interests.

Data and materials availability

All data associated with this study are present in the paper.

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